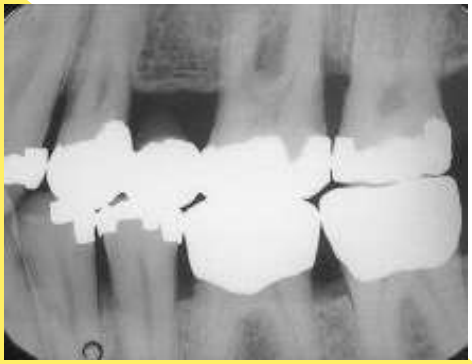
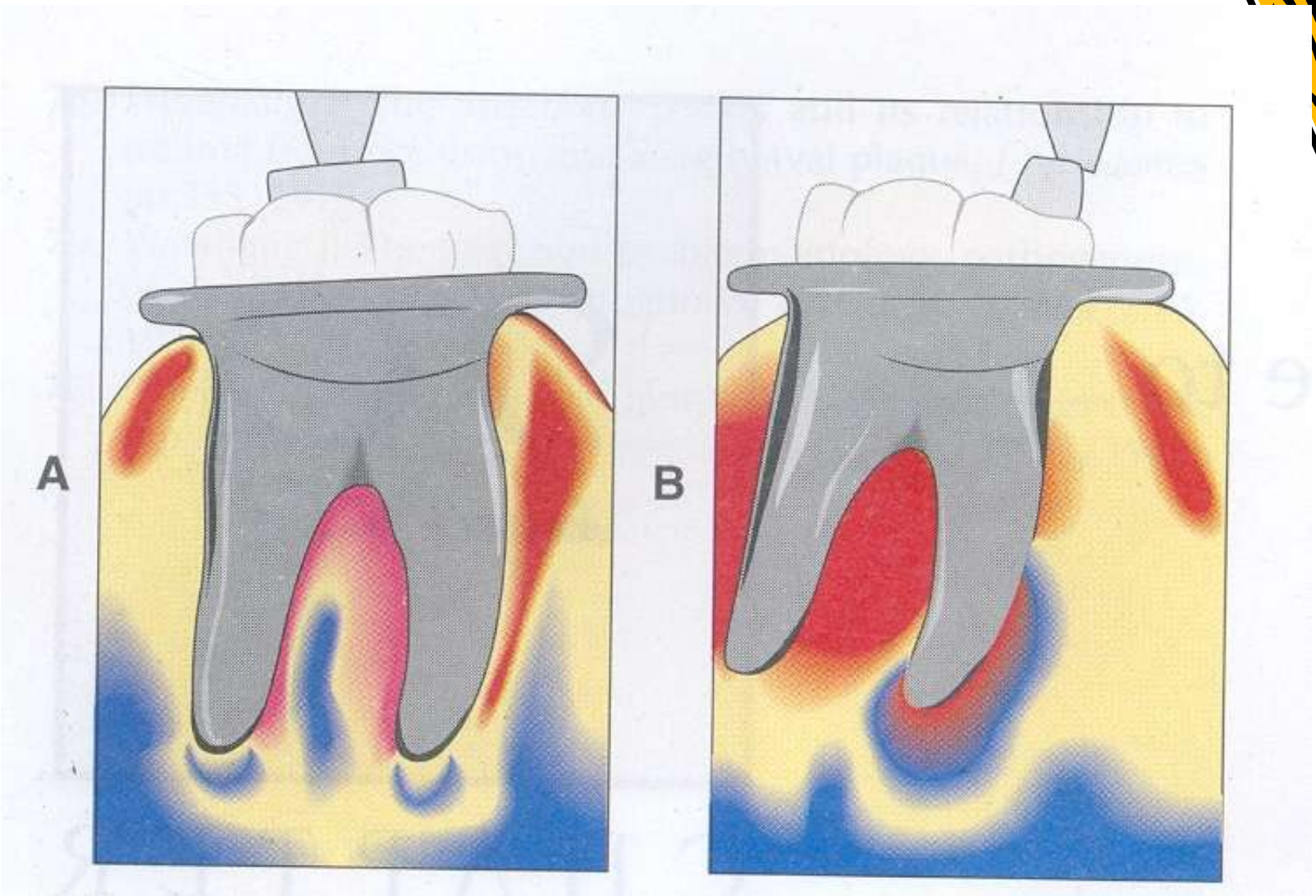


TRAUMA FROM OCCLUSION

Dr. Amit Wadhawan

ADAPTIVE CAPACITY OF THE PERIODONTIUM TO OCCLUSAL FORCES

- Whenever a force is exerted on the crown of a tooth the periodontium attempts to accommodate it.
- Varies in different persons and in the same person at different times.
- The effect depends on the magnitude, direction, duration and frequency of the forces.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TFO

- When occlusal forces exceed the adaptive capacity of the tissues, tissue injury results. The resultant injury is termed *trauma from occlusion.*
- *TFO* refers to the tissue injury, not the occlusal force.
- An occlusion that produces such injury is called a *traumatic occlusion.*

ACUTE AND CHRONIC TRAUMA

- **Acute:** results from an abrupt occlusal impact, e.g. biting on a hard object.

- **Chronic:** develops from gradual changes in occlusion produced by wear, drifting movement and extrusion of teeth along with parafunctional habits such as bruxism and clenching.

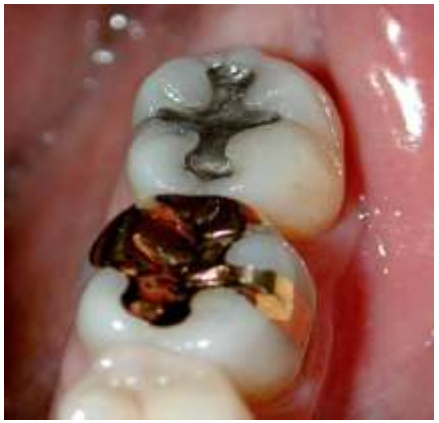
- The criterion that determines if an occlusion is traumatic is whether it produces periodontal injury, not how the teeth occlude.

PRIMARY & SECONDARY TFO

- When TFO is the result of alterations in occlusal forces it is called primary TFO.
- When it results from reduced ability of the tissues to resist the occlusal forces it is known as secondary TFO.

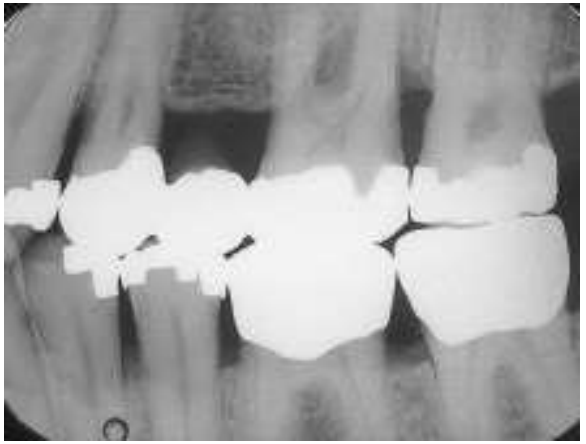
Primary TFO

- Only alteration to which a tooth is subjected is occlusion.
  - insertion of a high filling
  - insertion of a prosthetic replacement that creates excessive forces on abutment and antagonistic teeth



Secondary TFO

- Occurs when adaptive capacity of tissues to withstand occlusal forces is impaired by bone loss.
- Previously well tolerated forces become traumatic.



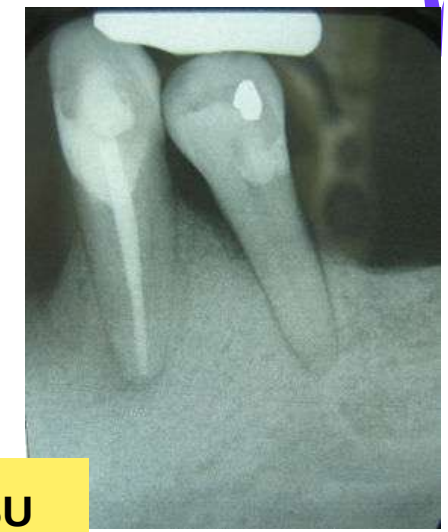
STAGES OF TISSUE RESPONSE TO INCREASED OCCLUSAL FORCES

- STAGE I: Injury
- STAGE II: Repair
- STAGE III: Adaptive remodeling of the periodontium

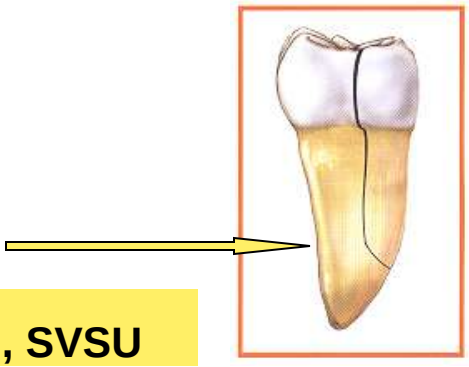
Stage I: Injury

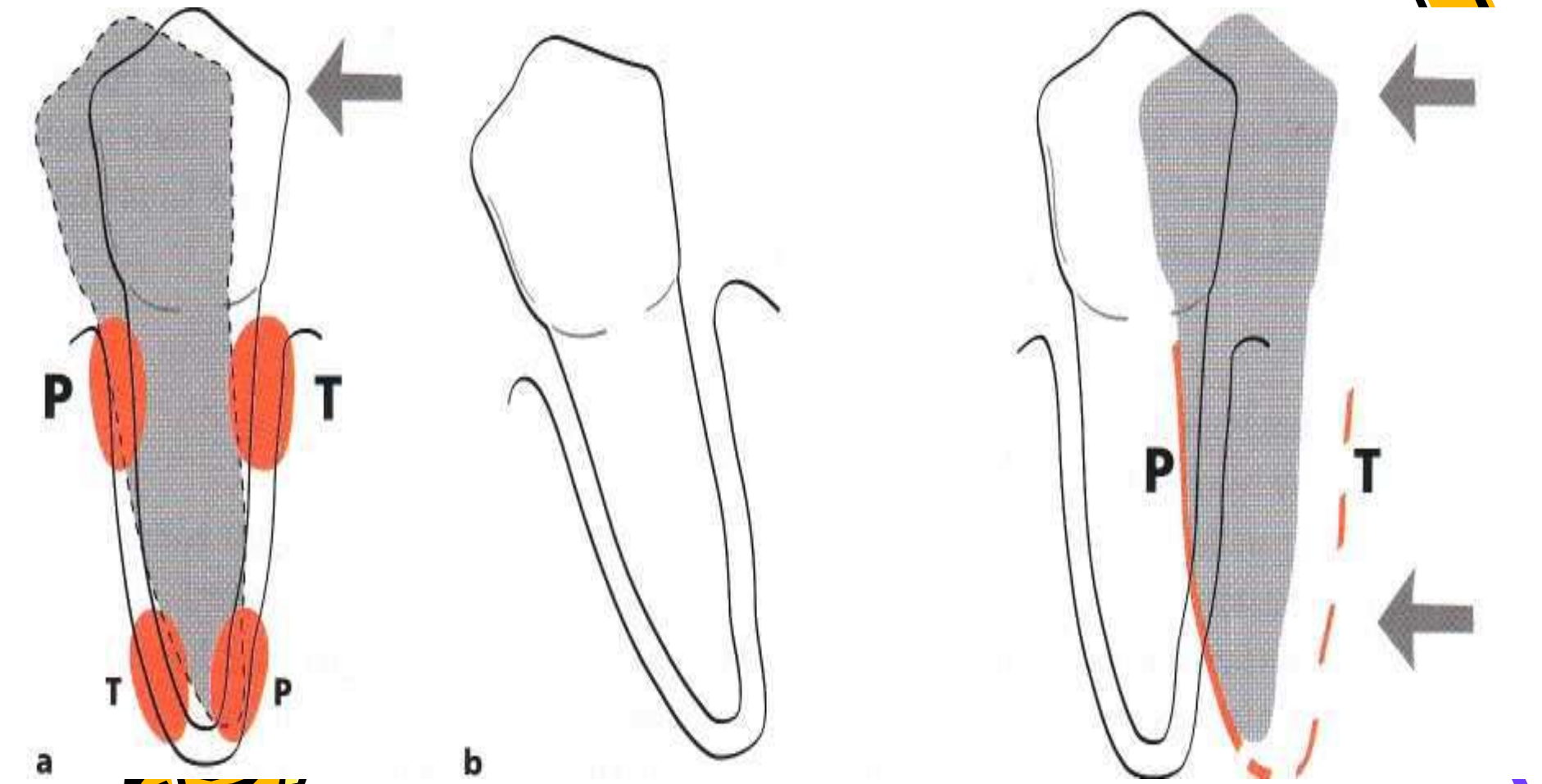
- Tissue injury is produced by excessive occlusal forces.
- The body attempts to repair the injury and restore the periodontium.
- This can occur if the forces are diminished or if the tooth drifts away from them.

- Chronic force – periodontium is remodeled to cushion its impact.
- Ligament is widened at the expense of bone, resulting in angular bone defects *without periodontal pockets*, and the tooth becomes loose.



- Axis of rotation / fulcrum
- Single rooted teeth – located in the junction between the middle third and the apical third of the clinical root.
- Forces of occlusion create areas of pressure and tension on opposite sides of the fulcrum.

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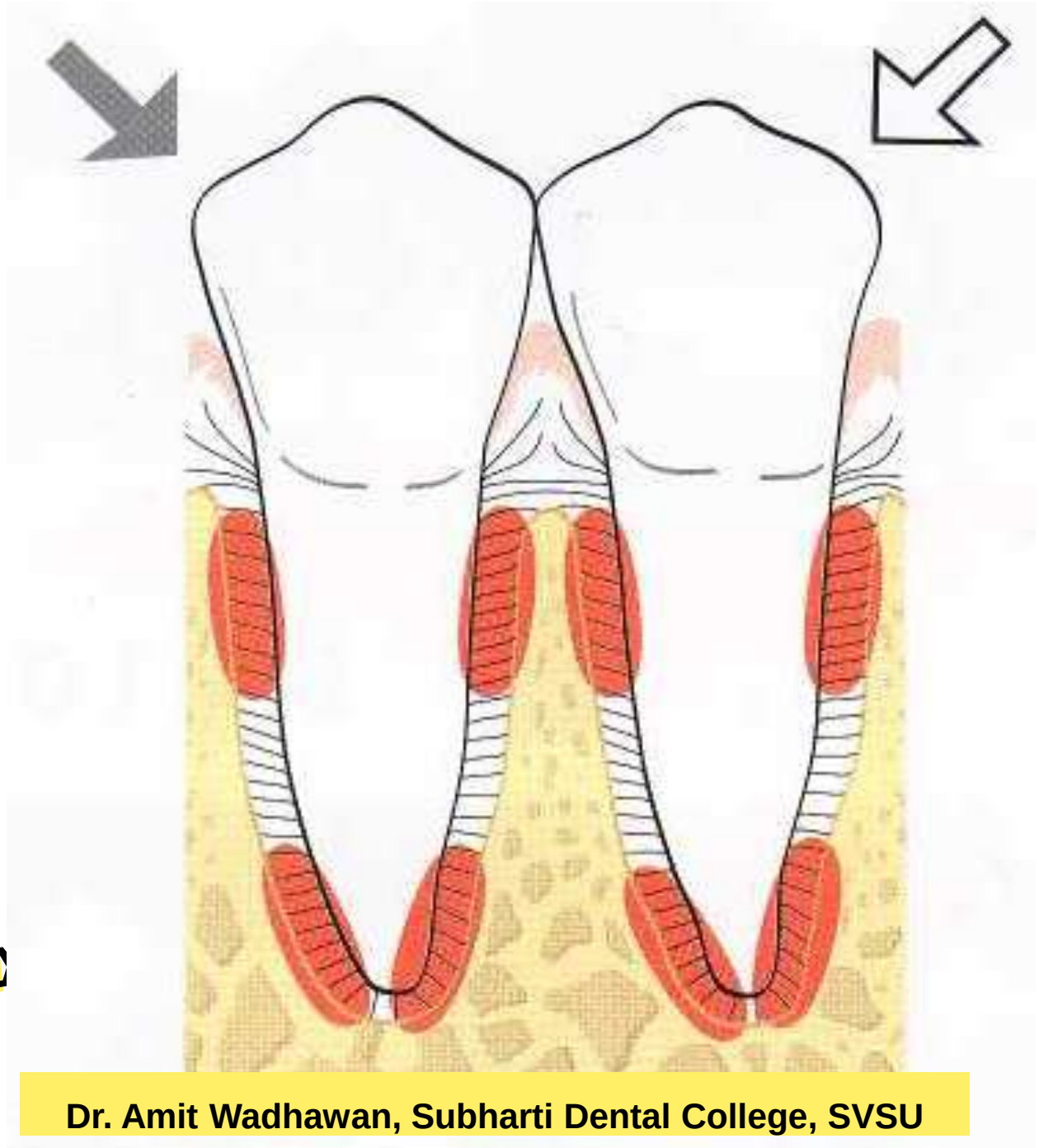
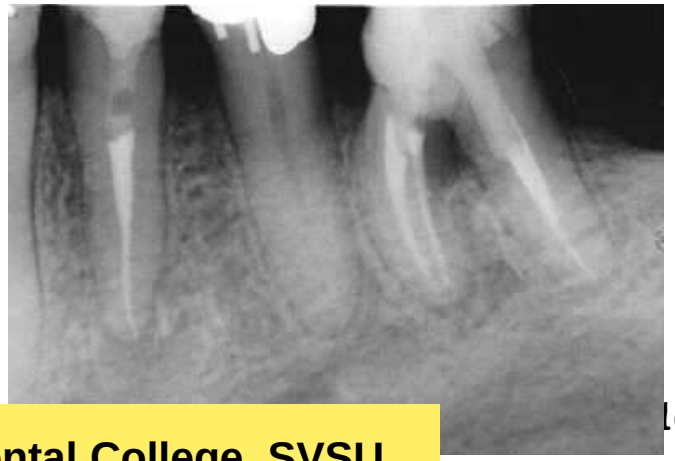
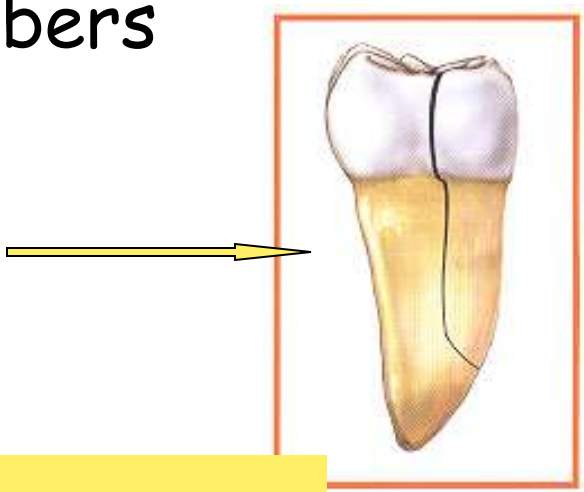


- Areas of periodontium most susceptible to injury from excessive occlusal forces are :

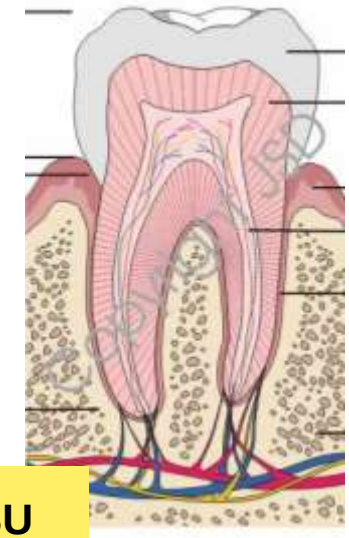
  furcation areas



- Slightly excessive pressure :
  - stimulates resorption of alv. bone
  - Widening of pdl lig. space
- Slightly excessive tension :
  - Elongation of pdl lig. Fibers
  - Apposition of alv. bone

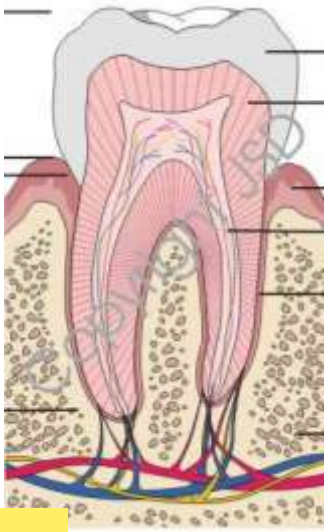


- Areas of increased pressure – blood vessels are numerous and reduced in size.
- Areas of increased tension – blood vessels are enlarged.

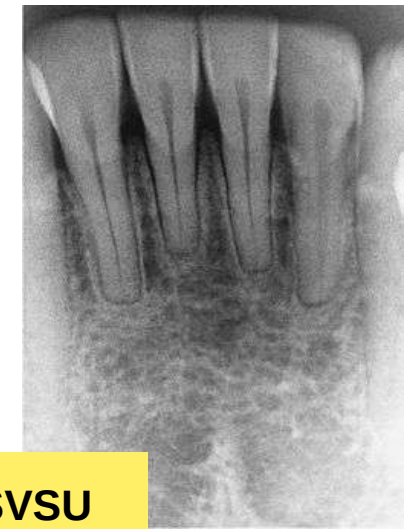


- GREATER PRESSURE
- Compression of fibers – areas of hyalinization
- Subsequent injury – necrosis of areas of ligament.
- Vascular changes – within 30 min- impairment and stasis of blood flow
- at 2-3 hrs blood vessels packed with erythocytes, which start to fragment
- between 1-7 days disintegration of blood vessel walls

- SEVERE TENSION
- Widening of periodontal ligament
- Thrombosis
- Hemorrhage
- Tearing of pdl lig.
- Resorption of alv. bone



- Pressure severe enough to force the root against the bone causes necrosis of the pdl lig and bone.
- The bone is resorbed from viable pdl lig adjacent to necrotic areas and from marrow spaces - undermining resorption.



Stage II: Repair

- Repair is constantly occurring in the normal periodontium and TFO stimulates reparative activity.
- When bone is resorbed by excessive occlusal forces , body attempts to reinforce the thinned bony trabeculae with new bone : buttressing bone formation.

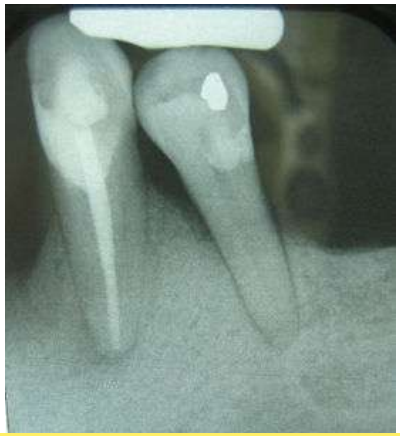
TYPES OF BUTTRESSING

- Central buttressing – occurs within the jaw
- Peripheral buttressing – on the bone surface
- Peripheral buttressing produces a shelf like thickening on the alv margin termed as lipping.

Stage III: Adaptive Remodeling

- If the repair process cannot keep pace with the destruction, the periodontium is remodeled in an effort to create a structural relationship in which the forces are no longer injurious to the tissues.

- This results in a thickened pdl lig , which is funnel shaped at the crest, and angular defects in the bone with ***no pocket formation***.
- The involved teeth become loose.



STAGES

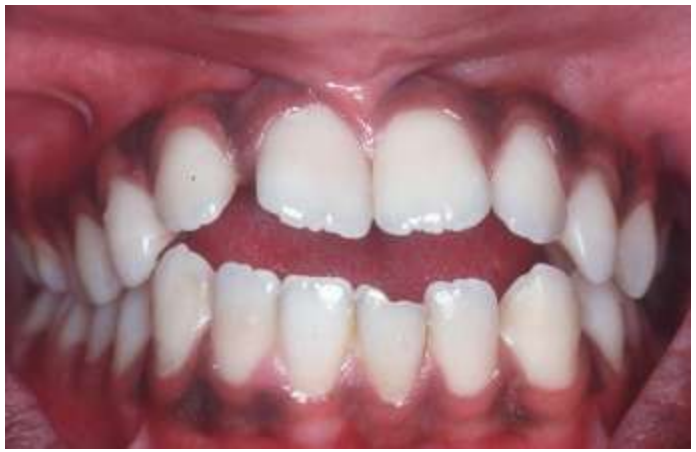
- Injury phase – increase in areas of resorption and decrease in bone formation
- Repair phase – decreased resorption and increased bone formation
- Adaptive remodeling – resorption and formation return to normal

Insufficient Occlusal Force

- Thinning of pdl lig.
- Atrophy of the fibers
- Osteoporosis of alv. Bone
- Reduction in bone height

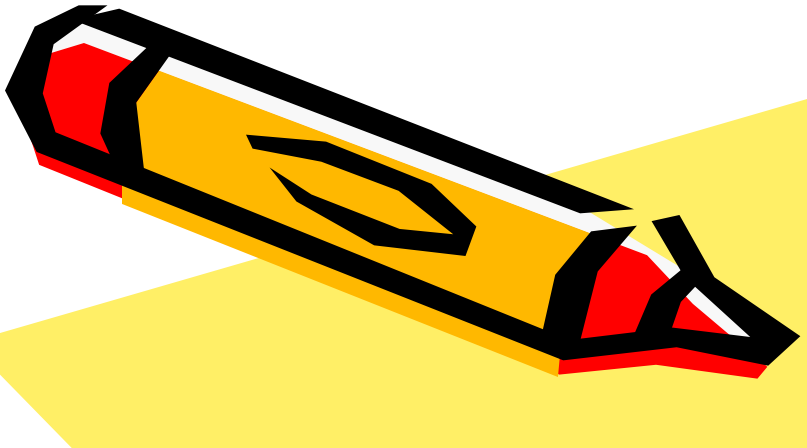
CAUSES

- Open-bite relationship
- Absence of functional antagonists
- Unilateral chewing habits

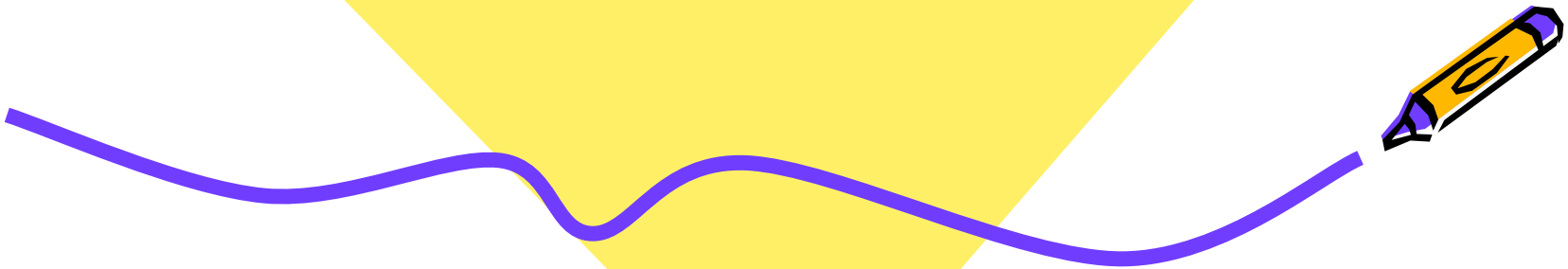


Reversibility of traumatic lesions

- TFO is reversible
- Injurious force must be removed for repair to occur
- Persistent trauma and inflammation impair the reversibility of traumatic lesions



Influence of TFO on progression of marginal periodontitis



HISTORICAL BACKGROUND

- 1901: Karolyi postulated that interaction may exist b/w TFO & alveolar pyrrohea.
- Box (1935) & Stones (1938) reported experiments in sheep & monkeys.

CONCEPTS

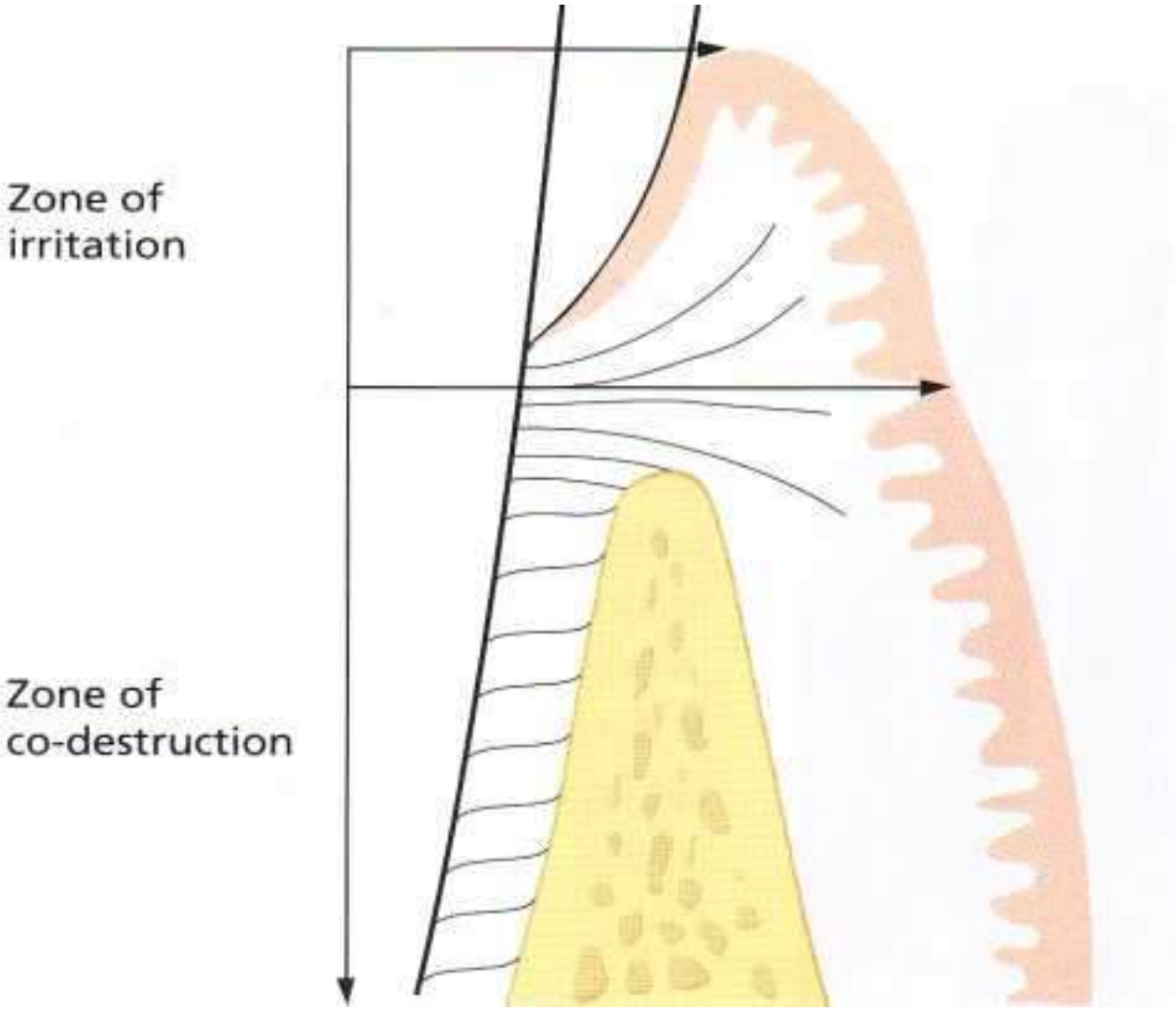
- GLICKMAN CONCEPT (1965)
- WAERHAUG CONCEPT (1979)

GLICKMAN CONCEPT

- *Progressive tissue destruction of the periodontium at a "traumatized tooth" will be different from that characterizing a "non-traumatized" tooth.*
- *Such teeth develop angular bony defects & infrabony pockets.*

ZONES OF PERIODONTIUM

- Zone of irritation : marginal & interdental gingiva.
- Zone of co-destruction : *periodontal ligament, the root cementum and the alveolar bone*


Zone of
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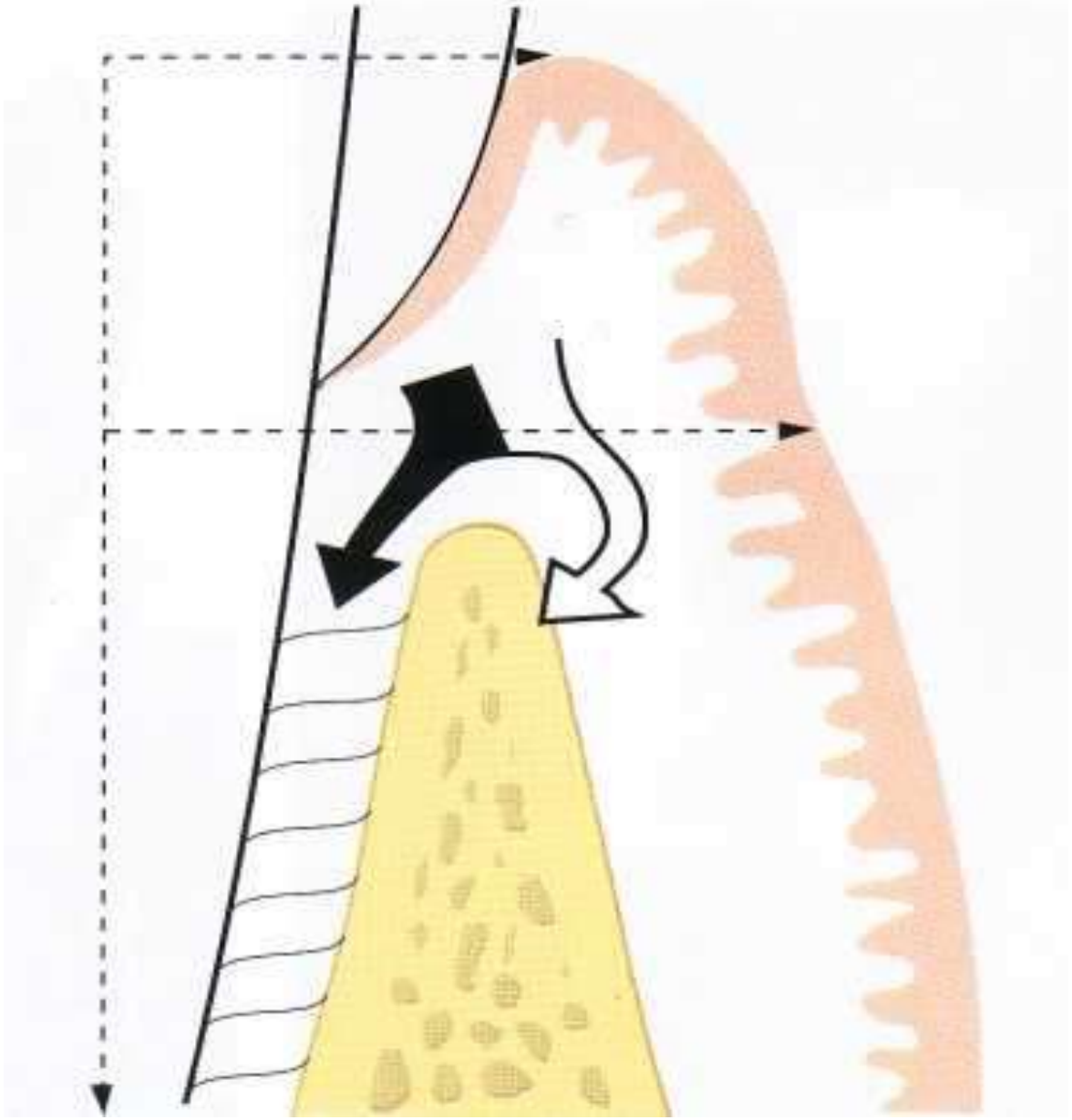

- The spread of an inflammatory lesion from the *zone of irritation* ***directly down into the periodontal ligament*** *(*i.e. not via the interdental bone) may hereby be facilitated
- This alteration of the "normal" pathway of spread of the plaque-associated inflammatory lesion results in the development of angular bony defects.

WAERHAUG'S CONCEPT

- Examined autopsy specimens.
- Concluded that angular bony defects and infrabony pockets occur equally at periodontal sites of teeth which are not affected by TFO as in traumatized teeth.

CONCLUSIONS

- *TFO cannot cause pocket formation.*
- *Causes bone resorption – s/be regarded as a physiological adaptation to the forces.*
- *In teeth with periodontitis, TFO may enhance the rate of progression of the disease, i.e. act as a co-factor in the destructive process.*